TOWNSHIP OF LANARK

A MUNICIPAL SURVEY OF THE VILLAGE OF LANARK

Ministry of the Environment
Ontario

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Director
Southeastern Region

TOWNSHIP OF LANARK

A MUNICIPAL SURVEY

OF THE

VILLAGE OF LANARK

MUNICIPAL & PRIVATE ABATEMENT SECTION

SOUTH EASTERN REGION

1976

REPORT ON A MUNICIPAL SURVEY OF THE VILLAGE OF LANARK

INDEX

VILLAGE OF LANARK

Municipal Survey

Introduction

On August 24th and 25th, 1976 a municipal survey was undertaken in the Village of Lanark. Surveys of this nature are performed routinely by Ministry of the Environment staff to assess existing municipal services and/or to determine the requirements for these services in areas where individual wells and sewage disposal systems are in use. An attempt is also made during the survey to identify all existing and potential sources of pollution.

The assistance and information received from the following persons and organizations for this report is gratefully acknowledged:
Mrs. J. Dugdale - Clerk, Village of Lanark
Mr. J. Craig - Leeds, Grenville & Lanark Health Unit.

Locations and Description

The Village of Lanark is located approximately ten miles north of the Town of Perth on County Road 1, in the County of Lanark. There is one major "wet" industry, Glenayr Knit Limited, located in the community. Maple Grove Public School serving the village and environs is located in the north end and has a school population of approximately 350.

Topography

All natural drainage from the village flows to the Clyde River which passes through the centre of the community. The topography is moderately rugged with a shallow overburden, numerous rock outcroppings and generally high rock horizon. The rock is a fractured sandstone or limestone.

Population

The population has decreased slightly over the past ten years from 923 in 1963 to 815 in 1976. There have been no recent plans for subdivisions submitted for this area. With no new industries, it is probable that the village population will remain relatively stable at the present figure, or decrease slightly.

Existing Services

At present the village has neither a sewage collection system nor a sewage treatment plant; the residents depend solely on individual sewage disposal systems. Approximately 25% of these systems were installed with Health Unit approval within the last ten years. A few malfunctioning systems were discovered during the survey; however, the Health Unit was already aware of these situations. Water supply in the village is generally by individual drilled wells. Two dug wells however were sampled during the survey. Thirty-five percent of the wells sampled had been drilled within the last ten years and 12% were older than twenty years.

It was also noted that a substantial number of residences utilized cisterns to supplement their ground water supplies. This practice is considered acceptable where the quantity of ground water is inadequate or the quality objectionable, and/or where a municipal water supply is not available. Since rain water is characteristically low in hardness and alkalinity, little soap is needed when used for laundry purposes. However the rain will wash dust, dirt, bird droppings, leaves, paint and other material on the roof into the cistern unless special provision is made to by-pass the first rain water and to filter the water. The by-pass may consist of a simple manually or float-operated damper or switch placed in the leader drain.

Existing Services Cont'd.

When in one position, all the water will be diverted to a float-control tank or to waste away from the building foundation and cistern; when in the other position, water will run into the cistern. Under no circumstances should the cistern plumbing be cross-connected to the ground water piping.

It is recommended that cistern water be disinfected and filtered prior to human consumption.

Previous Studies (Water Works)

In 1965, the Ontario Water Resources Commission was requested to perform a pumping test on a well in the Village of Lanark to determine its capacity. The well was intended to be the source of supply for the proposed water works system #64-W-150. This aquifer test was performed by the Division of Water Resources from January 5 to 7, 1966. The report on the testing concluded that the well was capable of yielding 140 gallons/minute on a perennial basis, and except for a high iron content, the water was of satisfactory chemical and bacterial quality. This project was placed in abeyance later in 1966 when the tenders received were substantially higher than the estimated costs.

Well Survey

Sampling Procedure

On August 24th and 25th, 1976 an attempt was made to secure a bacteriological sample from every well in the village and a chemical sample from every second or third residence. A total of 92 bacteriological and thirty chemical samples were collected during the survey. These figures represent approximately fifty to sixty percent of the wells in the village. The bacteriological samples were transported each day to the Ministry of Health laboratory in Ottawa for examination. The chemical samples were shipped to the Ministry of the Environment laboratory in Kingston for analyses.

Well Survey Cont'd.

Bacteriological Results

The main reason for bacteriological testing is to determine if pathogenic bacteria are present in the well water. The presence of certain coliforms, as revealed by this test, indicate fecal contamination, and thus the possible presence of pathogenic bacteria. Two standard groups of indicator micro-organisms are total and fecal coliforms. Total coliforms are of soil, vegetation and/or fecal origin. Fecal coliform, however, can only be associated with human or animal fecal matter and indicate a relatively recent source of pollution.

Discussion of Bacteriological Results

Residences visited during the survey are shown on the map appended to the report. Each resident who had his well tested, and where the results were adverse or doubtful, was advised in writing by the Ministry of the Environment. These residents were also advised to boil their drinking water. The Leeds, Grenville & Lanark District Health Unit was informed of the bacteriological results and requested to assist the home-owners in cases where individual correction was possible. Individual correction, in most cases, would involve re-drilling the well and increasing the length of casing, disinfecting the well and cistern if used or replacement of malfunctioning septic tank systems.

It should be noted that 55% of the adverse or doubtful samples taken were collected in the northern portion of the village.

A summary of the bacteriological results is presented in Table One while a compilation of all bacteriological results is presented in Appendix I.

TABLE ONE

WELL SURVEY RESULTS

VILLAGE OF LANARK

	Number	% of Total Village
Residences Inspected	92	50 - 60%

	Number	% of Total Inspected
Drinking Water Imported	10	12
Laboratory Results		
* Satisfactory	65	70
** Doubtful	7	8
*** Adverse	20	22

Individual Method of Waste Disposal	Number	% of Total Inspected
Septic Tanks' Tile Field	79	86
Privy	6	7
Other	2	2
No Information	5	5

* Satisfactory - (Total coliform organisms = 0)
(fecal coliform organisms = 0)

** Doubtful - (Total coliform organisms = 4 or less)
(fecal coliform organisms = 0)

*** Adverse - (Total coliform organisms = 4 or more)
(fecal coliform organisms - present)

Discussion of Chemical Results

As stated previously, thirty random chemical samples were collected during the survey. With the exception of two dug wells, all wells sampled were drilled.

The constituents commonly found in ground water that have a significant effect on domestic use were analysed for at the Ministry of the Environment laboratory in Kingston. The results are presented in Appendix Two.

The following is a breakdown of the significance and occurrence of these constituents:

Nitrates - are considered non-toxic to adults; however high levels in domestic water supplies do contribute to a condition known as infant methemoglobinemia (blue baby disease) in which the oxygen-carrying capacity of the blood is inhibited. Therefore a maximum acceptable level of 10 mg/l (milligrams per litre) as N has been established if the water is to be used for infant feeding. Since nitrates are present in relatively high concentrations in sewage, elevated nitrate levels in the well water can be considered as an indication of malfunctioning septic systems or faulty well construction.

Analysis for nitrate revealed five wells with nitrate levels greater than the permissible 10 mg/l and nine wells with elevated nitrate levels (greater than 5 mg/l).

Chlorides - Although chlorides pose no direct health hazards, a water quality objective of 250 mg/l for domestic water supplies has been specified. Only one well was found to have chloride in a concentration greater than the objective of 250 mg/l.

Hardness - The total hardness measures the "soap consuming power" of a water due to the presence of metallic cations. Hard waters are objectionable because they form insoluble compounds with soap. This reaction reduces the efficiency of washing procedures and increases the cost of the washing process. The presence of high hardness in well waters has also been known to cause lime scale formations in plumbing fixtures.

Hardness Cont'd. The majority of the wells sampled had hardness levels in the range of 300 to 400 ppm which can be considered as normal for aquifers located in limestone deposits. The water however, is classified as very hard in these concentrations.

Iron - Iron is non-toxic at high levels but objectionable in domestic supplies because of the colour and bitter taste it imparts. It is also known to cause reddish-brown stains on plumbing fixtures and laundry. The Ministry of the Environment water quality objective for iron in domestic water supplies is 0.3 mg/l.

Nine of the thirty samples analysed had iron concentrations greater than 0.3 mg/l. High iron concentrations may be substantially reduced by the installation of a carbon filter or by disinfection.

Summary of Well Survey Results

The conclusions reached upon reviewing the information and data collected to date are summarized as follows:

a) Sixty percent of the residences in the Village of Lanark were sampled for bacteriological examination. Twenty-two percent of the wells were found to be unfit for human consumption and another 7% were in the doubtful category.

b) The chemical results indicate that the ground water is being affected by leachate from individual subsurface sewage disposal systems. Approximately 40% of the chemical samples had high or elevated nitrate levels. The high rock horizon, thin soil cover, rugged topography, small lot sizes, old and/or improperly installed or constructed wells are considered to be contributing factors to the well contamination problem. The problem is somewhat localized to the northern portion of the village; however, contaminated wells were found throughout the community.

Proposed Provincial Project

On May 4, 1976 the village clerk forwarded a resolution of Council requesting the initiation of sewage and water works projects for the village, to the Ministry of the Environment. On May 31, 1976 this request was forwarded to the South-eastern Region by the Project Co-ordination Branch, to establish the need for these projects. On November 17, 1976 it was determined by telephone that the region's findings had been reviewed by the grading committee and the projects had been passed to the Minister for his approval. The next step in the process will be the appointment of a consultant to prepare a design brief. This brief will include suggested treatment methods for both water and sewage, source of water, means of sewage effluent disposal, preliminary lay-out of water distribution system and sewage collection system and a preliminary estimate of the cost. The Project Co-ordination Branch will then make their recommendation to the village, including cost, and request a resolution of village council asking the Ministry of the Environment to proceed. Approval of the Ontario Municipal Board will be required at this stage. Final design, tendering and construction will then be proceeded with. While time frames are difficult to estimate, particularly at this stage, a period of five years can be anticipated, providing all necessary approvals are obtained, before completion of the works.

River Survey

Water Uses:

Industrial

During this survey, only the Glenayr Knit Limited was utilizing the Clyde River as a source of water supply for its process requirements. Water usage was estimated to be 4,000 gallons per day for the rinsing and dyeing process.

Industrial Cont'd. Waste water is filtered prior to discharge from the plant. The average Biochemical Oxygen Demand (BOD_5) and total solids effluent concentrations are 200 ppm and 1,000 ppm respectively. However, because the water usage is relatively low, the actual BOD_5 loading to the Clyde River is similarly low (8 lbs. BOD_5/day).

Recreational

The Clyde River is used to some extent for bathing purposes within the Village boundaries. A public bathing area is located upstream of George Street at the end of Hilliar Street East.

Sampling Procedure

On September 13, 1976 four chemical and four bacteriological samples were collected from the Clyde River. The sampling locations, A, B, C and D are shown on the appended map of the village.

Bacteriological Results

Ministry of the Environment microbiological criteria for water used for body contact recreational activities states that: where ingestion is probable, recreational waters can be considered impaired when the coliform, fecal coliform, and/or interococcus geometric mean density exceeds 1,000, 100 and/or 20 per 100 ml respectively, in a series of at least ten samples per month. By using the above criteria, the bacteriological results obtained from the local Health Unit, and presented in Table 2, indicate that the Clyde River is suitable for bathing purposes in the area upstream of George Street. The downstream portion of the river has a high bacteriological population which reflects the impact of the storm water discharge to the Clyde River at George Street. Although storm sewers are not necessarily highly contaminated with fecal matter, observations of the storm sewer outfalls made at the time of the survey suggested that some contamination was occurring.

TABLE 2

VILLAGE OF LANARK

RIVER SURVEY - BACTERIOLOGICAL RESULTS

1974 - 1975

Date/74	Location Town Centre Brydge		Location County Road #12	
	Total Coliform 100 ml	Fecal Coliform 100 ml	Total Coliform 100 ml	Fecal Coliform 100 ml
April 29	4	4	305	44
May 16	145	56	2200	300
" 22	15	6	800	52
" 29	30	10	2100	700
June 10	50	8	2200	152
" 12	50	40	1400	38
" 19	185	8	3100	3100
" 26	66	66	410	410
July 3	320	320	2300	330
" 10	100	62	8000+	350
" 24	800	18	2900	1180
" 31	100	8	8000+	800+
Aug. 7	150	60	7200+	800+
" 14	200	16	8000+	800+
" 21	145	26	8000+	650
" 28	120	18	8000+	2830
Geometric Mean Density/100 ml.	136.2	24.8	6126	906
Date/75				
May 13	10	10	1400	270
" 26	75	26	2200	780
" 29	50	44	2500	30
June 12	1300	390	2500	250
" 19	105	18	1100	140
" 26	90	26	5600	220
July 8	155	14	1100	170
" 3	148	148	5100	230
" 17	400	34	470	470
" 24	155	36	3200	160
" 31	2200	24	2800	240
Aug. 14	70	40	3300	340
" 7	70	10	5000	104
" 21	2000	500	800+	530
" 28	7400	430	22000	840
Geometric Mean Density/100 ml	120	37	1994	206

Chemical Results

As stated previously, samples were taken at four locations on the Clyde River. These samples were analysed for the following constituents: BOD_5, total solids, dissolved solids, suspended solids, total phosphorus and total nitrates. A comparison of the sample constituent concentrations was made and no overall change in stream water quality could be determined.

The sample results referred to above are presented in Table 3.

TABLE 3

VILLAGE OF LANARK

RIVER SURVEY-SEPTEMBER 13, 1976

	Sampling Location	BOD_5 mg/l	Suspended Solids mg/l	Total Kjeldahl Nitrogen as N mg/l	Total Phosphorus as P mg/l	Total Coliforms per 100 ml	Fecal Coliforms per 100 ml
A.	Clyde River at end of Clarence Street	1.6	< 15	.41	.022	35	10
B.	Clyde River at end of Hilliar St. E.	2.0	< 15	.41	.028	140	20
C.	Clyde River at Mill Street	2.0	< 15	-	-	8000+	800+
D.	Clyde River at Dam (down stream)	2.0	< 15	.46	0.16	8000+	420

Summary of River Survey

Conclusions based on data collected during the river survey are summarized as follows:

a) High bacterial coliform concentrations in the lower portion of river (below George Street) are indicative of sanitary wastes gaining access to the storm sewers and/or direct discharge of sanitary wastes from private residences or industries bordering on the river.

b) Although relatively high levels of BOD_5 and total solids were characteristic of the effluent being discharged to the Clyde River from the Glenayr Knit Limited, no overall change in the stream chemical and physical water quality could be determined.

Solid Waste Disposal

Disposal Site

The site which is located on Lot 3, Concession 2, Township of Lanark, and presently utilized by the community, has been approved by this Ministry for the disposal of inorganic material (i.e. paper, brush, construction debris). The site itself has good screening from public view and is sufficiently isolated to prevent odour problems. Coverage at the site is done on a twice monthly basis with imported fill material. The yearly cost of the operation has been calculated to be $2.61/household/year. This cost is somewhat lower than the costs reported from other municipalities in the area with similar operations and points out a basic difference in operating procedures. That difference is believed to be in the amount of supervision. With increased supervision at the site, a better control on the type of incoming refuse could be achieved.

Solid Waste Disposal Cont'd.

Collection

Collection of refuse in the village confines is done on a weekly basis by a local contractor. The collected refuse is then transported to, and disposed of, at the Perth sanitary landfill located on Lot 28, Concession X, Township of North Elmsley. The cost of collection and disposal was estimated to be $33.18/household/year. This expenditure is comparable to other communities in the area with the same services.

Summary

The present method of collection and disposal of household refuse is satisfactory; however, the operation of the inorganic waste disposal site located near the village could be improved with increased supervision.

General Conclusions

Approximately 30 to 35% of the wells sampled were bacteriologically or chemically contaminated by surface water infiltration and/or by leachate from individual subsurface sewage disposal systems.

Sanitary wastes from private homes or industries are gaining access to the Hilliar Street storm sewer or the Clyde River in sufficient amounts to render the downstream portion of the river unsuitable for water body contact recreational purposes.

With the limited number of unsatisfactory situations and the high cost of servicing, correction of the existing facilities on an individual basis should be thoroughly studied before embarking on a program of communal servicing. An engineer-contractor should therefore be retained to conduct a study of correcting water pollution problems in the Village of Lanark on an individual basis or limited communal basis.

The waste disposal site located on Lot 3, Concession II, Township of Lanark, does not have adequate supervision during the periods when it is open to the public as prescribed in Regulation 824 of the Environmental Protection Act.

Recommendations

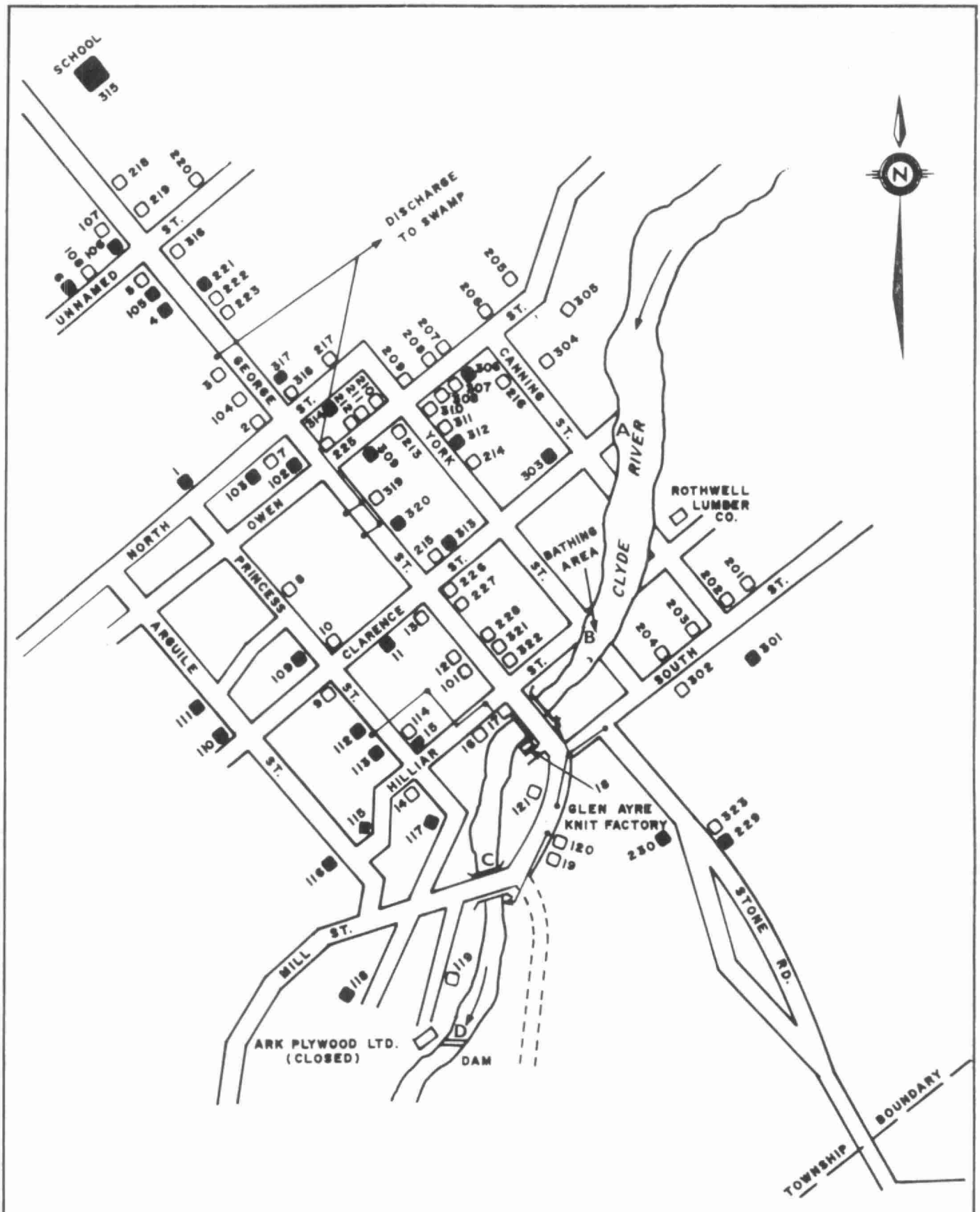
1. The Leeds, Grenville & Lanark District Health Unit, with the assistance of the Ministry of the Environment, undertake an intensive dye testing program to locate all sources of sanitary waste discharges to the Clyde River and initiate any abatement action required.

2. A consulting engineer should be retained to study correction of existing water pollution problems in the Village of Lanark on an individual basis or limited communal basis. Until such a study has been undertaken consultants should not be appointed to prepare a Design Report on communal servicing.

3. The municipality should take steps to ensure that proper control is maintained on the type of wastes entering the waste disposal site.

R. South

for D. S. Harrison,
Environmental Officer,
Municipal & Private
Abatement Section.



SAMPLING POINTS ○ BACTERIOLOGICAL

● CHEMICAL AND BACTERIOLOGICAL

STORM SEWER ——→

MINISTRY OF THE ENVIRONMENT

VILLAGE OF LANARK
MUNICIPAL SURVEY
AUGUST 1976

SCALE 1" = 600'	
DRAWN BY J.B.M.	DATE NOV 1976
CHECKED BY R.A.W.	DRAWING NO. 6645

APPENDIX I

LANARK VILLAGE - WELL SURVEY - AUGUST 1976

Sample No.	Coliform/100 ML Total	Fecal	Depth/Age of Well	Sewage Disposal System Type	Age/Yrs.
1	80+	6	D/100*	Holding Tank	4
2	80+	4	D/ *	-	-
6	80+	40	60/2	Septic Tank	2
8	50	0		-	-
102	80+	20		Septic Tank	-
103	80+	80+	90/6	Septic Tank	6
104	2	0			
107	80+	16	160/2	Septic Tank	2
109	2	0	/6	Septic Tank	6
110	2	0	110/7	Septic Tank	4
118	2	0		-	-
120	2	0	40/22	Septic Tank	30
203	80+	80+	30/5	Septic Tank	2
204	52	2		Septic Tank	20
207	32	2	80/40	Pit Privy	-
208	28	2	/20	Pit Privy	-
209	80+	80+	190/3	Septic Tank	2
215	80+	80+	75/3	Septic Tank	17
212	4	2	/10	Septic Tank	6
217	4	2	40/16	Septic Tank	16
220	12	2	/3	Septic Tank	3
224	6	0		Septic Tank	15
225	10	2	60/7	Septic Tank	7
306	46	6	47/4	Septic Tank	4
307	44	8	80/28	Septic Tank	5
309	2	0	85/3	Septic Tank	6
312	2	2	75/1	Septic Tank	10
3	0	0	35/100	Privy	-
4	0	0	/16	Septic Tank	3
5	0	0	100/30	Septic Tank	30
7	0	0	60/20	Septic Tank	15
9	0	0	/3	Septic Tank	3
10	0	0	80/	Septic Tank	-
11	0	0	103/25	Septic Tank	15
12	0	0	63/14	Septic Tank	1
13	0	0	80/30	Septic Tank	10

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Appendix I

Lanark Village - Well Survey - August 1976

Sample No.	Coliform/100 ML Total	Fecal	Depth/Age of Well	Sewage Disposal System Type	Age/Yrs.
14	0	0	98/12	Septic Tank	30
15	0	0	-	Septic Tank	-
16	0	0	75/3	Septic Tank	-
17	0	0	190/20	-	-
101	0	0	55/11	Septic Tank	11
104	0	0		Septic Tank	-
105	0	0		Septic Tank	8
106	0	0	154/20	Septic Tank	3
108	0	0	52/29	Septic Tank	16
111	0	0	100/2	Septic Tank	2
112	0	0	/1	Septic Tank	-
113	0	0	100/13	-	-
114	0	0	42/12	Septic Tank	1
115	0	0	100/2	Septic Tank	3
116	0	0		-	-
117	0	0	70/2	Septic Tank	2
121	0	0	100/5	Septic Tank	1
201	0	0	90/6	Septic Tank	2
202	0	0	90/6	Septic Tank	6
205	0	0	/40	Septic Tank	2
206	0	0		Septic Tank	-
210	0	0	/10	Septic Tank	8
211	0	0	/7	Septic Tank	8
213	0	0	48/4	Septic Tank	5
214	0	0	48/5	Septic Tank	10
216	0	0	115/6	Septic Tank	6
218	0	0	60/5	Septic Tank	10
219	0	0	100/3	Septic Tank	3
221	0	0	/6	Septic Tank	7
222	0	0	72/8	Septic Tank	16
223	0	0	/10	Septic Tank	10
226	0	0	/18	Septic Tank	15
227	0	0	/15	Septic Tank	15
228	0	0	/20	Septic Tank	20
229	0	0	86/1	Septic Tank	1
230	0	0		-	-

....3

Appendix I

Lanark Village - Well Survey - August 1976

Sample No.	Coliform/100 ML Total	Fecal	Depth/Age of Well	Sewage Disposal System Type	Age/Yrs.
301	0	0	93/10	Septic Tank	-
302	0	0	130/1	Septic Tank	-
303	0	0	47/15	Septic Tank	15
305	0	0	20/50	Septic Tank	12
308	0	0	90/50	Septic Tank	20
310	0	0	65/4	Septic Tank	3
311	0	0	135/3	Septic Tank	-
313	0	0	-	Septic Tank	-
314	0	0	/40	Septic Tank	5
315	0	0	/7	Septic Tank	7
316	0	0	-	Septic Tank	-
317	0	0	96/7	Privy	-
318	0	0	64/7	Septic Tank	7
319	0	0	77/5	Septic Tank	16
320	0	0	/17	-	-
322	0	0	95/12	Septic Tank	12
323	0	0	128/1	Septic Tank	-
18	0	0	65/23	Septic Tank	14
19	0	0	83/10	Septic Tank	19

* Dug Well

APPENDIX II

VILLAGE OF LANARK

CHEMICAL RESULTS FOR PRIVATE WELLS

Identification Number	Hardness as $CaCO_3$	Alkalinity as $CaCO_3$	Iron as Fe	Chloride as Cl	Nitrate as NO_3
116	360	240	0.10	88	25.0
115	18	268	0.05	54	0.30
15	390	336	0.15	106	1.2
117	360	316	0.05	125	1.2
11	380	352	0.05	165	5.5
18	470	340	0.25	150	<.02
113	332	292	0.10	28	0.46
112	450	360	<.05	80	18.0
118	360	370	0.35	56	0.14
119	404	324	0.25	58	0.18
301	352	352	<.05	22	5.5
306	430	400	0.10	90	11.0
303	520	400	0.10	165	2.4
304	510	430	<.05	90	11.0
309	404	368	0.50	56	0.06
312	500	440	<.05	100	11.0
313	470	350	0.55	185	5.2
314	620	480	0.20	390	8.4
106	352	344	0.10	22	1.3
105	388	368	<.05	70	3.1
103	500	550	<.05	205	14.0
1	54	54	<.05	3	0.60
6	368	388	0.15	22	5.5
102	460	480	<.05	90	6.5
109	348	336	0.05	56	5.0
110	242	260	0.15	5	1.1
111	254	268	0.10	4	0.88
4	440	410	0.45	105	5.5
308	460	410	0.05	50	4.9
209	540	440	<.05	105	19.0
213	520	420	0.05	85	1.0
214	470	370	0.10	160	15.0

Note - All concentrations are in mg/l

Appendix II

Village of Lanark

Chemical Results for Private Wells (cont'd.)

Identification Number	Hardness as $CaCO_3$	Alkalinity as $CaCO_3$	Iron as Fe	Chloride as Cl	Nitrate as NO_3
201	328	268	<.05	16	0.46
205	372	320	1.05	40	0.60
225	580	460	0.95	590	5.5
19	292	256	1.0	5	0.02
120	288	284	0.25	8	0.02
121	256	228	0.45	28	0.22

Note - All concentrations are in mg/l